REVIEW OF THE PHILIPPINE MEMBRACIDÆ

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TWO PLATES AND 3 TEXT FIGURES

INTRODUCTION

The following study has been made with the view of bringing up-to-date the knowledge of those forms of the family Membracidæ known to occur in the Philippine Islands. This group of homopterous insects, so remarkable for the unusual and peculiar development of the pronotum, is well represented in the fauna of the Islands and, indeed, from this region have emanated some of the most bizarre of the species.

The extensive and careful collecting of Professor C. F. Baker, of Los Baños, has made it possible to recognize practically all of the species hitherto described, as well as a few forms which are apparently new. These are here reviewed and classified with the hope that they may be made more easily recognizable. The synoptic tables given are admittedly artificial, but it is believed that these keys, based on easily determined structures, even though perhaps unnatural, will make it possible for the student to recognize all of the species known to the Islands at the present time.

This paper is in no sense monographic and is intended merely as a preliminary contribution toward a more thorough study of the local forms of the family. A brief discussion of each species is given in cases in which the species has been recognized, and a summary is given of the original description of those species which have not been taken in recent years.

I am greatly indebted to Professor Baker, who has very kindly sent me practically all of the material on which this study is based and whose excellent collecting has made the work possible.

SUBFAMILIES OF THE MEMBRACIDÆ

Six subfamilies are recognized in the Membracidæ, and these may be separated as follows:

Key to the subfamilies.

a^1. Scutellum wanting or entirely concealed by the pronotum.
  b^1. Tarsi of equal length or the posterior pair longest.
    c^1. Anterior tibiæ foliaceous ..... **Membracinæ.**
    c^2. Anterior tibiæ simple.

d^1. Apical cell of tegmen not petiolate ..... Darninæ.
d^2. Apical cell of tegmen petiolate, the adjacent cells touching before it.
e^1. Tegmina opaque, veins not distinguishable..... Tragopinæ.
e^2. Tegmina membranous, veins distinct..... Smiliinæ.
b^2. Posterior tarsi very short, much shorter than anterior or intermediate ..... Hoplophorinæ.
a^2. Scutellum present and usually, but not always, uncovered..... Centrotinæ.

DISTRIBUTION AND CHARACTERS OF THE CENTROTINÆ

It is interesting to note that only one of these subfamilies—the Centrotinæ—is represented in the species thus far taken in the Islands.[1] This subfamily is the dominent subfamily in the East Indies and the Orient, but other subfamilies are found in India and in Australia and may appear in the Philippine fauna, in which case the above table will be available.

The presence of the scutellum, which is the subfamily character, can sometimes be determined only by dissection, but in most cases this structure is plainly visible at the sides or just beneath the posterior process of the pronotum. In all cases the pronotum is greatly developed, completely covering the mesonotum and the metanotum in the adult insect. The anterior pronotum is often produced in horns and spines, the function of which is conjectural.

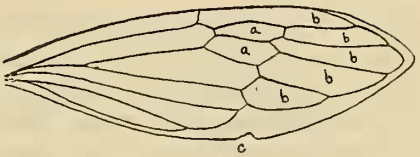
HISTORICAL AND BIBLIOGRAPHICAL

Most of the species found in the Islands were described by Walker, Stål, Buckton, and Distant. Walker's descriptions are most unsatisfactory, and some of his species will, perhaps, be located only by reference to type material. Stål's work is so excellent as to need no comment; his genera and species are evidently the result of careful study and should be recognized if found. Buckton's contribution to the Philippine faunal literature is negligible, but his species must remain in the synonymy until they can be definitely located. Distant's descriptions are uniformly excellent and his figures good, but his types are from British India, and his species cannot perhaps be placed with absolute certainty from Philippine material, although it seems that one or two are identical.

In the bibliography which is given for each species it has been necessary greatly to abbreviate the titles and references, which

[1] Buckton has described two species of the subfamily Membracinæ as noted later in the text, but it seems inadvisable to recognize them here from the evidence at hand.

in some cases are of considerable length. To supplement this, a complete bibliography of all of the references cited is given at the end of the paper.



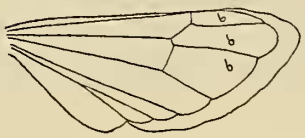


FIG. 1. Fore and hind wings of *Tricentrus fairmairei* Stål. *a*, discoidal cells; *b*, apical cells; *c*, internal angle.

NOMENCLATURE

Some of the terms mentioned in the following descriptions and a few of the characters used in the generic and specific diagnoses are more or less peculiar to the family and should perhaps be briefly explained. The term tegmina is used throughout for the forewings, following Stål, Fowler, Goding, Van Duzee, and other authors. In this wing the discoidal areas (the inclosed cells in the center of the wing) and the terminal or apical areas (the cells reaching the apical margin) are frequently used, but are not entirely reliable characters (fig. 1, *a* and *b*.) The clavus is the narrow posterior portion at the base of the tegmen which is next to the scutellum when the wing is closed. The internal angle of the tegmen is the angle made by the union of the clavus with the corium at the internal margin, usually about two thirds of the distance from the base to the tip (fig. 1, *c*). The terminal areas of the hind wings have proved valuable taxonomic characters, but unfortunately are hard to determine in dried specimens without relaxation. If the specimen is fresh, however, no difficulty is experienced in the use of this character, and even in dried specimens the tegmen may usually be lifted far enough to expose the tip of the underwing without damage to the insect. The sides of the pronotum above the eyes are usually swollen or produced into humeral angles

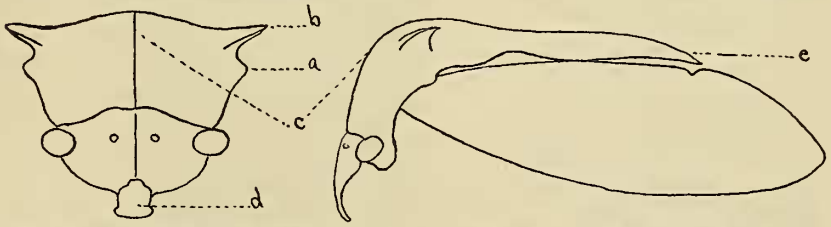


FIG. 2. Front and lateral outline of *Tricentrus fairmairei* Stål. *a*, humeral angles; *b*, suprahumeral horns; *c*, metopidium; *d*, clypeus; *e*, posterior process.

(fig. 2, *a*). Above these angles arise the suprahumeral horns (fig. 2, *b*). The front of the pronotum between the suprahu-

meral horns has been termed the metopidium (fig. 2, *c*).[2] Along the median dorsal line of the pronotum is often a distinct ridge, the dorsal carina, which is generally present on the posterior process, if not percurrent. The posterior extension of the pronotum, which often reaches beyond the tip of the abdomen and sometimes beyond the apex of the tegmen, is known as the posterior process (fig. 2, *e*). The relative position of the ocelli and the eyes is a character which is of value for specific, if not for generic, diagnosis. The clypeus (fig. 2, *d*) in the Membracidæ is the sclerite just below the median line of the vertex and is usually distinct; the labrum below it is much reduced and generally flattened against the body, so that it is not visible from a front view, thus giving the clypeus a labial appearance. The posterior trochanters in some genera show a curious row of teeth along their internal margin (fig. 3). This character is often somewhat difficult to verify, but is most valuable. The tibiæ of the forelegs are occasionally flattened or foliaceous (always so in the subfamily Membracinæ), and usually spined. The presence of punctures and pubescence is used in specific descriptions.

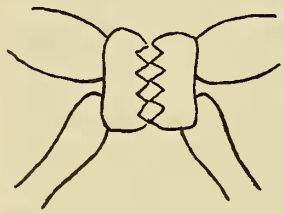


FIG. 3 Armed posterior trochanters.

LIST OF SPECIES

The following check list includes all of the species of the subfamily Centrotinæ described from the Islands to date:

Centrochares horrificus Westw.
Pyrgonota bifoliata Westw.
Pyrgonota tumida Stål.
Pyrgonota philippina Stål.
Pyrgonota bifurca Stål.
Pyrgonota semperi Stål.
Pyrgonota pinguiturris sp. nov.
Leptobelus dama Germ.
Lobocentrus zonatus Stål.
Dograna falco Buckt.
Leptocentrus taurus Fabr.
Leptocentrus leucaspis Walk.
Leptocentrus reponens Walk.
Leptocentrus aduncus Buckt.
Emphusis bakeri sp. nov.
Sertorius erigens Walk.
Periaman brevifrons sp. nov.
Tricentrus convergens Walk.
Tricentrus fairmairei Stål.
Tricentrus capreolus Walk.
Tricentrus pilinervosus Funkh.
Tricentrus plicatus sp. nov.
Tricentrus attenuatus sp. nov.
Centrotus magellani Fairm.
Centrotus dilatatus Walk.
Centrotus torcus Buckt.
Sipylus crassulus Stål.
Sipylus nodipennis Funkh.
Centrotoscelus typus Funkh.
Ebhul carinatus sp. nov.
Gargara luconica Fairm.
Gargara pygmaea Walk.
Gargara patruelis Stål.
Gargara varicolor Stål.

[2] Cf. Van Duzee, E. P., Studies in North American Membracidæ. *Bull. Buffalo Soc. Nat. Sci.* (1908), 9, 30.

Gargara pulchripennis Stål.
Gargara nigrofasciata Stål.
Gargara tuberculata Funkh.
Gargara luteipennis Funkh.
Gargara nitidipennis Funkh.
Gargara nigrocarinata Funkh.
Gargara brunnea Funkh.
Gargara trifoliata Funkh.
Cryptaspidia pubera Stål.
Cryptaspidia tagalica Stål.
Cryptaspidia impressa Stål.
Cryptaspidia obtusiceps Stål.

Key to the genera of the Centrotinæ.

a^1. Tibiæ more or less foliaceous; sides of thorax armed with two teeth.
  b^1. Two suprahumeral horns; posterior process bilobed..... **Centrochares.**
  b^2. Single dorsal horn, often bilobed at tip; posterior process simple. **Pyrgonota.**
a^2. Tibiæ simple; sides of thorax unarmed.
  b^1. Hindwings with four apical areas.
    c^1. Pronotum highly discally elevated; suprahumeral horns absent.
      d^1. Posterior process simple and gradually acute..... **Leptobelus.**
      d^2. Posterior process lobate..... **Lobocentrus.**
    c^2. Pronotum not highly discally elevated; suprahumeral horns present.
      d^1. Posterior pronotal process connected with scutellum by a perpendicular prolongation ..... **Dograna.**
      d^2. Posterior pronotal process without prolongation below.
        e^1. Posterior process distant from scutellum..... **Leptocentrus.**
        e^2. Posterior process touching scutellum or very close to it.
          f^1. Pronotum high and gibbous before base of posterior process.
            g^1. Suprahumeral horns in a continuous line with the anterior margin of pronotum..... **Emphusis.**
            g^2. Suprahumeral horns diverging from line of anterior margin of pronotum..... **Sertorius.**
          f^2. Pronotum not raised above base of posterior process, but in a continuous line with it..... **Periaman.**
  b^2. Hindwings with three apical areas.
    c^1. Suprahumeral horns present.
      d^1. Hind trochanters armed with teeth..... **Tricentrus.**
      d^2. Hind trochanters unarmed..... **Centrotus.**
    c^2. Suprahumeral horns absent.
      d^1. Hind trochanters armed with teeth.
        e^1. Body about as wide as long; lateral angles prominent... **Sipylus.**
        e^2. Body much longer than wide; lateral angles not prominent. **Centrotoscelus.**
      d^2. Hind trochanters not armed.
        e^1. Posterior process strongly sinuate..... **Ebhul.**
        e^2. Posterior process not strongly sinuate.
          f^1. Body robust; size small..... **Gargara.**
          f^2. Body slender; size larger..... **Cryptaspidia.**

Genus CENTROCHARES Stål

Centrotus FABR. (in part); *Oxyrhachis* GERM. (in part); *Pterygia* DELAP. (in part); *Notocera* A and S. (in part).

The genus *Centrochares* was erected by Stål in 1866,[3] but no species was mentioned as belonging to the genus. The generic

[3] Hemiptera Africana (1866), 4, 86.

characters may, however, be deduced from the table given to be as follows: Bilobed posterior process, foliaceous tibiæ, sides of thorax armed with spines, horns present above lateral angles. Later in the same year [4] Stål designates as the type of the genus Westwood's old species (*Centrotus*) *horrificus*, which Walker had incorrectly placed in DeLaporte's genus *Pterygia* of the subfamily Membracinæ.[5] In the Hemiptera Philippinarum [6] this species is given as the only species in the genus. The genus has remained monotypic.

The single species of the genus bears a strong superficial resemblance to the forms of the genus *Pterygia*, but may immediately be distinguished by the well-developed and plainly visible scutellum, which places it at once in another subfamily. The genus may be characterized not only by the foliaceous tibiæ and toothed thorax as described by Stål, but also by the most remarkable development of curious spines and tubercles over the surface of the pronotum. These bristling spines are of various shapes, lengths, and colors and give to the insect a decidedly terrifying aspect.

Centrochares horrificus Westw. Plate I, fig. 1.

Centrotus horrificus WESTW., Proc. Zool. Soc. (1837), 130; GUÉR., Mag. Zool. (1841), II, 3, Pl. 82; LEFEBVRE, Bull. Ann. Soc. Fr. (1842), 21.
Pterygia horrificus WALK., List Hom. Brit. Mus. (1851), 500; (1852), 4, Tab. 4, figs. 4 and 5.
Centrochares horrificus STÅL, Analect. Hem. (1866), 386; STÅL, Hem. Phil. (1870), 731; BUCKT., Mon. Memb. (1903), 266; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.
Pterygia horrifica BUCKT., Mon. Memb. (1903), 73, Pl. XII, fig. 5.
Pterygia postica BUCKT., Mon. Memb. (1903), 70, Pl. XI, figs. 4–5a.
Pterygia spinula BUCKT., Mon. Memb. (1903), 73, Pl. XII, fig. 4.

Centrochares horrificus is readily distinguished from all other membracids thus far described from the Islands on account of the peculiar bristling spines, which are not found on any other species. The insects vary considerably in size and color. The males are usually smaller and darker than the females.

I believe Buckton's two Philippine species, *Pterygia postica* [7] and *Pterygia spinula*,[8] are both *Centrochares horrificus*. It seems incredible that the subfamily Membracinæ should be represented in the Islands by these two species only, and it is

[4] *Ber. ent. Zeitschr.* (1866), 10, 386.
[5] Cat. Hom. Brit. Mus. (1851), pt. II, 500.
[6] Stål, *Oefver. Kongl. Vet. Akad. Forh.* (1870), 731.
[7] Mon. Memb. (1903), 70.
[8] Ibid., 73.

more than likely that Buckton followed Walker's error in assigning his insects to the wrong genus. I have specimens of *C. horrificus* which conform to Buckton's descriptions and figures for his supposed new species.

Centrochares horrificus, once examined, will not be readily confused with other species, and the following brief description will, I believe, suffice to assure its recognition:

Female.—Ferruginous with yellowish spines. Suprahumeral horns long, spreading, flattened, much swollen at tips. Pronotum with sudden elevation just above scutellum. Posterior process reaching extremities of tegmina with high, swollen, bilobed elevation before the tip.

Head long, subfoliaceous, dark ferruginous, finely punctate, very slightly pubescent, median line smooth; clypeus twice as long as wide, obovate, bearing on each side two yellow tubercles; eyes large, translucent white with brownish fascia, bordered internally with a row of four or five whitish yellow tubercles; ocelli elevated, transparent, nearer to the eyes than to each other, situated above a line passing through center of eyes, bordered internally with three or four white tubercles. Pronotum ferruginous mottled with black; deeply punctate, sparingly pubescent, covered with irregular whitish yellow spines; humeral angles prominent; suprahumeral horns long, high, spreading, flattened, tips swollen, more or less triquetrous, marked with irregular flattened areas, tubercular; median ridge sharp, distinct, percurrent, closely tubercled; metopidium rounded; median region above scutellum in a rounded elevation; posterior elevation twice as high as median, bilobed, rough, marked in flattened areas; tip of posterior process blunt. Scutellum distinct, strongly bifid. Tegmina opaque, sordid ferruginous marked with black; base somewhat punctate; tip dark. Underside of body dark brown. Sides of meta- and mesothorax bearing teeth.

Legs light brown; tibiæ much flattened, tuberculate; tarsi yellow-brown.

Length, 5 to 6 mm.; width between extremities of pronotal horns, 4 to 5 mm.; width between bases of pronotal horns, 0.5 to 1 mm.

Male.—Dull black with yellowish spines. Tegmina brown-black, light transparent area just below posterior elevation of pronotum. Body very rough, punctured. Underparts of body, base of legs, and femora black; tibiæ and tarsi light brown.

Length, 3.5 to 5 mm.; width between extremities of pronotal horns, 2 to 3.5 mm.; width between bases of pronotal horns, 0.4 to 0.9 mm.

Philippine Islands (Westwood, Walker, Stål, Buckton); LUZON, Los Baños, Mount Banahao (*Baker*).

Genus PYRGONOTA Stål

Centrotus FABR. (in part); *Smilia* GERM. (in part); *Hypsauchenia* GERM. (in part).

Pyrgonota, according to its author, is to be separated from the old genus *Hypsauchenia* of Germar chiefly by the lack of a dorsal lobe on the posterior process. Schmidt [9] does not recognize this as a generic distinction, and it is indeed doubtful whether the genus will stand as new species are added. For the present, however, since the Philippine forms may be thus arbitrarily grouped, it seems desirable to accept the genus tentatively for the sake of convenience.

Stål designates no type species, but the logical choice falls on *P. bifoliata* Westw., both on account of its abundance—all of the other species are apparently rare—and because it has long been known and figured in literature. All of the species of this genus are native to the Islands.

The following key, adapted from that of Stål, will enable the student to separate the species:

Key to the species of Pyrgonota.

a^1. Posterior process of thorax without lateral carinæ.
  b^1. Posterior process uniformly colored.
    c^1. Posterior process depressed and gradually slender behind middle.
      d^1. Anterior process ridged; tegmina with pale spot..... tumida.
      d^2. Anterior process not ridged; tegmina concolorous.... pinguiturris.
    c^2. Posterior process acutely tectiform behind middle..... philippina.
  b^2. Posterior process with large pale spot before middle..... bifoliata.
a^2. Posterior process of thorax with lateral carinæ.
  b^1. Posterior process gradually acuminate and concolorous..... bifurca.
  b^2. Posterior process higher behind than before the middle; marked with a pale spot..... semperi.

Pyrgonota bifoliata Westw. Plate I, fig. 2.

Centrotus bifoliatus WESTW., Proc. Zool. Soc. (1837), 130.
Smilia bifoliata WESTW., Guér. Mag. Zool. (1841), II, 3, Pl. 83; LEFEBVRE, Bull. Ann. Soc. Fr. (1842), 21.
Hypsauchenia westwoodi FAIRM., Rev. Memb. (1846), 521, Pl. 7, figs. 6–8; WALK., List Hom. Brit. Mus. (1851), 631; BUCKT., Mon. Memb. (1903), 211, Pl. 46, figs. 6, 6a.
Hypsauchenia bifoliata FAIRM., Rev. Memb. (1846), 521; SCHMIDT, Stett. Ent. Zeitg. (1906), 370.
Hypsauchenia bifasciata WALK., List Hom. Brit. Mus. (1851), 631.
Pyrgonota bifoliata Stål, Hem. Phil. (1870), 731; BUCKT., Mon. Memb. (1903), 270; FUNKH., Journ. Ent. & Zool. (1914), 6, 67.

[9] *Stett. ent. Zeitg.* (1906), 67, 370.

Pyrgonota bifoliata is a most bizarre species, recalling in general outline *Hypsauchenia hardwickii* Kirby, but with the anterior horn straighter and without the posterior elevation. Its frequent mention in literature makes its identification comparatively easy.

Chocolate-brown with broad whitish yellow patch covering middle of posterior process and extremity of this process darker. Pronotum and exterior basal area of tegmen broadly punctured and sparingly pubescent, the punctures separated by reticulated ridges, which form a network of polygonal areas. Pronotal horn very high, gradually narrowing to point of branching; two-branched at extremity, the branches spreading and flattened at tips. Posterior process tectiform. Entire posterior margin of pronotal horn armed with fine spines, these spines extending down over dorsal margin of posterior process and gradating into serrate teeth at extremity. Tegmina brown and opaque, exterior margin wavy; hindwings transparent, veins brown. Tibiæ foliaceous.

Length, head to tip of tegmen, 6 to 7 mm.; height of pronotal horn to point of branching, 5 mm.; length of branches of pronotal horn, 5 mm.

Philippine Islands (Westwood, Fairmaire, Walker, Stål, Buckton); LUZON, Los Baños (*Baker*).

Pyrgonota tumida Stål.

Pyrgonota tumida STÅL, Hem. Phil. (1870), 730; BUCKT., Mon. Memb. (1903), 270.

Black; head and thorax distinctly punctate. Dorsal process high, above the middle gradually becoming slender, strongly thickened at apex, both anterior and posterior margin bearing a single ridge, the sides three-ridged; the posterior carina slightly denticulate, the teeth continuing upon the posterior process. The posterior process gradually slender as seen from a side view, behind the middle subdepressed. Tegmina marked with a small, pale spot before the apex of the clavus. Feet flavo-testaceous.

Length, 8 mm.; width, 2.2 mm.

Described by Stål from the male only.

Philippine Islands (Stål).

Pyrgonota philippina Stål.

Pyrgonota philippina STÅL, Hem. Phil. (1870), 730.

Pitchy black; thorax strongly punctate. Dorsal process high, straight, leaning more or less forward, slightly recurved toward

apex, gradually becoming slender; anterior and posterior unicarinate, the sides with two or three carinæ; apex somewhat thick, truncate, and compressed anterior-posteriorly; carinate, the posterior carina minutely denticulate and extending upon the posterior process. Posterior process acutely tectiform, subcompressed. Tegmina with pale spot before apex of clavus. Hindwings vitreous. Feet flavous-pitchy.

Length, 8 mm.; width, 2.2 mm.

Described by Stål from the female only.

Philippine Islands (Stål).

I am inclined to think that this is the female of *P. tumida*, but am recognizing it tentatively, pending an opportunity to examine more specimens.

Pyrgonota bifurca Stål.

Pyrgonota bifurca STÅL, Hem. Phil. (1870), 731.

Piceous; head slightly punctate, thorax strongly punctate. Dorsal process varying in length, gradually becoming slender and leaning somewhat forward; anterior and posterior margins unicarinate, sides with two carinæ; apex with two slender triquerate processes, strongly diverging and slightly curving, compressed-ampliate in the middle. Posterior carinæ spiny, continuing on the posterior process. Posterior process acutely tectiform, narrow as seen from the side. Feet concolorous.

Length, 7.5 mm.; width, 2 mm.

Philippine Islands (Stål).

Pyrgonota semperi Stål.

Pyrgonota semperi STÅL, Hem. Phil. (1870), 731.

The species noted by Stål as *"C. Semperi"* in his work on the Philippine Hemiptera has never been recognized and is known only through his short description, which follows that of *P. bifurca* and is as follows:

Praecedenti maxime affinis, differt processu postico thoracis ante medium macula pallescente notato, pone medium quam anterius altiore, tegminibusque totis piceis. ♀ Long. 7, lat. 2 mill.

I have included this species in the preceding key, with the specific distinctions as indicated, in the hope that future collecting may lead to its identification.

Pyrgonota pinguiturris sp. nov. Plate I, fig. 3.

Pyrgonota pinguiturris is apparently near *P. tumida* Stål, but differs in being without carinæ on its pronotum and lacking the spot on the tegmina.

Ferruginous; rough; densely, coarsely, and deeply punctate; sparingly pubescent. Dorsal horn thick and heavy, uniformly cylindrical, somewhat swollen at apex with the suggestion of lateral processes at the tip. Posterior process gradually acuminate, slightly depressed at tip, extending just beyond extremity of abdomen. Tegmina uniformly opaque ferruginous; pointed at tips. Tibiæ broadly foliaceous.

Head subtriangular, longer than broad, finely and densely punctate, finely pubescent; eyes large, brown, extending halfway to lateral angles of pronotum; ocelli small, translucent, farther from each other than from the eyes and situated above a line passing through center of eyes; clypeus broader than long, trilobed, middle lobe longest, pubescent at tip. Pronotum uniform brown, very rough, coarsely punctate, very sparsely pubescent; dorsal horn cylindrical, of almost uniform thickness, inclining strongly forward, without anterior, posterior, or lateral carinæ, tip swollen and rounded above, on either side of tip a very slight lateral protuberance; lateral angles not prominent; scutellum distinct, bifurcate; posterior process slender, gradually acuminate, triquetrous, the roughly defined dorsal ridge giving it a tectiform appearance, extending just beyond the internal angles of tegmina. Tegmina opaque, strongly punctate over entire basal and costal areas, veins indistinct, tip pointed. Undersurface of body chocolate-brown; legs and feet ferruginous; tibiæ swollen and foliaceous. Type, female.

Length, head to tip of tegmina, 6.5 mm.; length of pronotal horn, 4 mm.; width between humeral angles, 2 mm.

LUZON, Mount Maquiling (*Baker*).

Genus LEPTOBELUS Stål

Centrotus FABR. (in part).

Leptobelus was erected by Stål in 1866 [10] for the reception of those species of the subfamily Centrotinæ in which the tibiæ were simple, sides of breast unarmed, hindwings with four apical areas, exterior discoidal area of tegmina petiolate, and disk of thorax elevated, bearing posterior process high above the body.

In this genus the prothorax rises in a high column, which gives off at its summit two lateral horns and the posterior process, the latter being distinctly raised above the abdomen and usually subparallel to it. The scutellum is longer than broad, with the tip more or less truncate. Only one species of the genus has been reported from the Islands.

[10] Hem. Afr. (1866), 4, 86.

Leptobelus dama Germ. Plate I, fig. 4.

Centrotus dama Germ., Rev. Silb. (1835), 258, Pl. 3, fig. 14; Fairm., Rev. Memb. (1846), 510; Walk., List Hom. Brit. Mus. (1851), 602.
Leptobelus dama Stål, Berl. Ent. Zeitschr. (1866), 386; Stål, Bid. Memb. Kan. (1869), 284; Atkins., Journ. Asiat. Soc. Beng. (1885), 54, 81; Dist., Fauna Brit. Ind.—Rhynch. (1907), 4, 15, fig. 11; Lefroy, Ind. Ins. Life (1909), 729, fig. 504; Banks, Phil. Journ. Sci., Sec. D (1910), 5, 47.

Leptobelus dama is apparently common throughout India and the East Indies. Professor Baker has sent me specimens from Palawan, and Banks has also reported it from the Islands. The species has been so often described and figured that further description is unnecessary, except for convenience in comparison should other species of the genus be found.

Shining black; densely punctate; base of scutellum and sides of breast gray pilose; tegmina translucent bronze with prominent brown veins; hind tibiæ very spiny. Lateral branches of pronotal horn long, sharp, slightly curving backward. Posterior process rising high above scutellum and gradually curving downward until it almost touches tegmina midway between internal angle and tip; this process sharply carinate above.

India (Fairmaire, Stål, Lefroy); East Indies (Walker); Java (Distant); Palawan, Puerto Princesa (*Baker*).

Genus **LOBOCENTRUS** Stål

The genus *Lobocentrus* was erected [11] for the species *zonatus* described by Stål from the Philippine Islands in 1870. Neither the genus nor the species has since been mentioned in literature, with the exception of a catalogue reference by Buckton as listed below. The genus is, however, well described and clearly defined, and its validity has never been questioned. It is apparently close to *Leptobelus* and is to be distinguished from that genus, according to the author, by the difference in position of ocelli, the lobe of the posterior process, and the number of discoidal areas in the tegmina.

Lobocentrus zonatus Stål.

Lobocentrus zonatus Stål, Hem. Phil. (1870), 728; Buckt., Mon. Memb. (1903), 268.

The following brief summary of the specific characters as listed by Stål may aid the student in recognizing *Lobocentrus zonatus*.

Black; distinctly punctate; head, thorax, and scutellum sparsely sericeous with golden-flavous pubescence, the sides of

[11] Hem. Phil. (1870), 727.

the breast very densely sericeous in the same manner. Tegmina obscure wine-colored, a translucent fascia before the middle and the veins fuscous; base black and punctate. Prothorax with percurrent median ridge; lateral horns extending outward and slightly curving backward, slender, gradually acuminate, bisulcate above; posterior process lobed, acutely tectiform.

Described from the female.

Length, 8 mm.; width, 3.5 mm.

Philippine Islands (Stål).

I have never seen a specimen of this species and have not been able to learn whether or not the type is available for study. It would seem, however, that the species should be recognized if found.

Genus **DOGRANA** Distant

Campylocentrus STÅL (in part).

Dograna is a very distinct genus, including those species in which the posterior process is united with the apex of the scutellum by a strong downward perpendicular prolongation. The suprahumeral horns are prominent; scutellum distinct and slightly longer than broad; posterior process curved. While the generic characters are more or less artificial, they are convenient in studying this rather confusing group of the Membracidæ. The genus was erected by Distant in 1907 [12] and placed by him in his division *Acanthophyesaria*. The genus contains at present but two species, one of which is native to the Philippines.

Dograna falco Buckt.

Campylocentrus falco BUCKT., Mon. Memb. (1903), 243, Pl. 56, figs. 2, 2a.

Dograna falco DIST., Fauna Brit. Ind.—Rhynch. (1907), 4, 24.

Apparently rare. I have seen one specimen bearing the locality label "Malinao." This specimen may be described as follows:

Very dark brown, almost black; thickly and roughly punctured; pilose with scattered golden hairs, particularly on scutellum and sides of mesothorax. Suprahumeral horns subtriquetrous, extending almost directly outward, very slightly upward and backward. Posterior process extending beyond internal angle of tegmina, connected to scutellum by downward prolongation; dorsal carinæ high and sharp; tip gradually acuminate. Tegmina vitreous, wrinkled, black and punctate at base. Undersurface of body and legs very dark brown; femora swollen; tibiæ finely spined; tarsi ferruginous. Female.

[12] Fauna of British India—Rhynchota (1907), 4, 24.

Length, 9 mm.; width between extremities of pronotal horns, 5.8 mm.

I believe this to be Buckton's species, though it is slightly larger than the specimen he describes. The habitat given by that author is Luzon, Philippine Islands. There was no date label nor further locality name on the specimen which I was permitted to examine.

Genus LEPTOCENTRUS Stål

Membracis FABR. (in part); *Centrotus* FABR. (in part).

Leptocentrus is an old and well-established genus,[13] including those forms in which the posterior process is well elevated above the body but does not bear a lobe below. The hind wings have four apical areas and the tegmina five apical and two discoidal. The suprahumeral horns are strong and usually widespreading. The genus is well represented in Africa and India; four species have been reported from the Philippines. These may be separated as follows:

Key to the species of Leptocentrus.

a^1. Posterior process short, not extending as far as the internal angle of tegmina ..... aduncus.
a^2. Posterior process extending beyond internal angle of tegmina.
  b^1. Suprahumeral horns extending strongly upward..... leucaspis.
  b^2. Suprahumeral horns almost horizontal.
    c^1. Front margin of suprahumeral horns flattened into subfoliaceous ridge ..... reponens.
    c^2. Front margin of suprahumeral horns not flattened..... taurus.

Leptocentrus taurus Fabr.

Cicada taurus LINN., Gmel. Ed. Syst. Nat. (1740), 1, 3; (1767), 4, 14; FABR., Spec. Inc. (1781), 2, 317; FABR., Mant. Ins. (1787), 2, 264.
Membracis taurus FABR., Syst. Ent. (1775), 676; OLIV., Enc. Méth. (1792), 7, 665; FABR., Ent. Syst. (1794), 4, 14.
Membracis rupicapra FABR., Ent. Syst. Suppl. (1798), 514.
Centrotus rupicapra FABR., Syst. Rhyng. (1803), 18.
Centrotus taurus FABR., Syst. Rhyng. (1803), 18; GERM., Rev. Silb. (1835), 3, 257; BLANCH., Hem. (1840), 3, 182; FAIRM., Rev. Memb. (1846), 510; WALK., List Hom. Brit. Mus. (1851), 602; Suppl. (1858), 158.
Membracis tricornis HARDW., Zool. Journ. (1828), 13; HARDW., Tabl. Suppl., Pl. 30, figs. c, d, f.
Centrotus terminalis WALK., List Hom. Brit. Mus. (1851), 604; MELICH., Hom. Cey. (1903), 109.
Centrotus vicarius WALK., List Hom. Brit. Mus. (1851), 605.

[13] Stål, Hem. Afr. (1866), 4, 87 and 90.

Leptocentrotus taurus STÅL, Hem. Afr. (1866), 4, 90; STÅL, Analect. Hem. (1866), 386; STÅL, Hem. Fabr. (1869), 2, 50; ATKINS., Journ. Asiat. Soc. Beng. (1885), 54, 85; GODG., Cat. Memb. N. Am. (1894), 477; BUCKT., Mon. Memb. (1903), 268; MELICH., Hom. Cey. (1903), 116; DIST., Fauna Brit. Ind. (1907), 4, 28; LEFROY, Ind. Ins. Life (1909), 731, 732; BANKS, Phil. Journ. Sci., Sec. D (1910), 5, 48.
Leptocentrus gazella BUCKT., Mon. Memb. (1903), 235, Pl. 53, fig. 5a.

Reported from the Philippine Islands by Banks as above. The large number of easily available references makes a description unnecessary. The species shows some slight variation in size, coloration, and position of pronotal horns when a large series is examined. Distant's figure [14] is typical. I have not seen Philippine material.

Assam, Calcutta (Atkinson); Tenasserim, Mytitta (Doherty); Borneo (Distant); Timor (Buckton); Philippine Islands (Banks); Ceylon (Melichar).

Leptocentrus leucaspis Walk.

Centrotus tauros (in part: error) WALK., List Hom. Brit. Mus. (1851), 602.
Centrotus leucaspis WALK., List Hom. Brit. Mus. Suppl. (1858), 158.
Leptocentrus leucaspis BUCKT., Mon. Memb. (1903), 235, Pl. 53, figs. 3, a, b; MELICH., Wien. Ent. Zeitg. (1905), 24, 294; DIST., Fauna Brit. Ind. (1907), 4, 30, fig. 25.

Black; roughly punctate; scutellum and sides of mesothorax densely pilose. Suprahumeral horns slender, triquetrous, extending upward, outward, and backward, well above dorsal line of pronotum; tips sharp. Posterior process tricarinate, arising well above scutellum and curving downward until it almost touches tegmina just behind internal angles. Tegmina vinaceous; veins somewhat obscure; base opaque and punctate. Legs and undersurface of body fuscous.

Length, 7 to 9 mm.; width between extremities of suprahumeral horns, 5 to 7 mm. The males are smaller and darker than the females.

British India and Philippines (Distant).

Leptocentrus reponens Walk. Plate I, fig. 6, *a* and *b*.

Centrotus reponens WALK., List Hom. Brit. Mus. (1851), 604; MELICH., Hom. Cey. (1903), 110.
Centrotus antilope STÅL, Freg. Eug. Resa, Ins. (1859), 284.
Leptocentrus antilope STÅL, Hem. Phil. (1870), 727.
Leptocentrus reponens ATKINS., Journ. Asiat. Soc. Beng. (1885), 54, 86; DIST., Fauna Brit. Ind. (1907), 4, 30; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

[14] Fauna of British India—Rhynchota (1907), 4, 28, fig. 24.

Evidently the commonest of the Philippine species of this genus. Walker, Stål, and Distant have all recorded it from the Islands, and Professor Baker has sent me specimens collected at Los Baños.

Black; coarsely and deeply punctate; scutellum and sides of meso- and metathorax densely white tomentose; metopidium and lateral areas of pronotum covered with long yellowish pubescence. Head broader than long, densely pilose, finely punctate; clypeus trilobed, longer than wide; eyes prominent, light brown; ocelli translucent, equidistant from each other and from the eyes, and situated on a line passing through center of eyes. Disk of pronotum thick, heavy, and cylindrical; suprahumeral horns flattened, front margin subfoliaceous, tips suddenly acute; these horns extending outward and backward, almost horizontal, not rising above highest point of posterior process. Posterior process arising from top of posterior region of pronotal disk, gradually sloping downward but not touching tegmina; slender, almost uniform in thickness, triquetrous, tip gradually acuminate. Tegmina hyaline with broad, well-defined brown veins; base very slightly punctate and somewhat pilose. White tomentose metathorax usually showing through base of wings. Undersurface of body, legs, and feet black.

Length, 8 mm.; width between extremities of pronotal horns, 6.5 to 7 mm.

Tenasserim, North Bengal (Walker); Sumatra (Distant); Philippine Islands (Walker, Stål, Distant); LUZON, Los Baños (*Baker*).

Leptocentrus aduncus Buckt.

Leptocentrus aduncus BUCKT., Mon. Memb. (1903), 236, Pl. 53, fig. 6.

This species has not been recorded since Buckton's original description, and it seems doubtful if it can be recognized from his short description and poor figure. It apparently may be distinguished only by the short horns and the short and auriculate posterior process as represented in his plate. Buckton's description follows:

> Dark fuscous, shining and punctured. Suprahumerals short and auriculate. Posterior horn stout at base and short. Tegmina fuscous. Frons hairy. Size 6 x 5 mm. Habitat-Luzon, Philippine Isles.

Genus EMPHUSIS Buckton

Centrotus FABR. (in part); *Centrotypus* STÅL (in part).

The genus *Emphusis* is peculiar in having been apparently incorrectly diagnosed by its author. Buckton states in his

original description that in *Emphusis* the suprahumeral horns are absent.[15] Distant, however, who presumably had Buckton's type before him, states that the suprahumeral horns are well developed but directed subhorizontally and recurved apically.[16]

The genus is close to *Centrotypus*, but differs in having the anterior part of the pronotum much more elevated and swollen and in having the anterior margin of the suprahumeral horns in a continuous line with the semicircular anterior margin of the metopidium. The hind wings have four apical areas, the tegmina five apical areas. To this genus must be assigned the following very remarkable species:

Emphusis bakeri sp. nov. Plate I, fig. 7, *a* and *b*.

Large, handsome, brilliantly marked. Head and pronotum black, the front of head, sides of metopidium, median dorsal area between pronotal horns, and lateral margin of pronotum as far as posterior process densely covered with snowy white tomentose excrescence. Pronotum rising thick and high with broad, widespreading suprahumeral horns. Dorsal margin of pronotum sloping roundly to posterior process, which is curved, decurrent, and extends to tips of tegmina. Tegmina black and punctate at base and costal margin; hyaline in middle; red bordered with brown at tip. The jet-black abdomen shows through the hyaline portion of the tegmina. Legs and feet fuscous-ferruginous. The marked contrast of the black, white, and red gives the insect a striking appearance. This is the largest membracid thus far reported from the Philippines.

Head longer than broad, black, deeply but not closely punctate; a broad, white, tomentose vertical band extending from base of head to extremity of clypeus and occupying the space between the ocelli the width of the clypeus; lateral margin of head strongly sinuate; eyes large, dark gray mottled with brown; ocelli pearly, much farther from each other than from the eyes and situated above an imaginary line extending through center of eyes; antennæ long and bristlelike; clypeus three-lobed, pilose. Pronotum strongly elevated, the disk appearing cylindrical from a front view, but extended posteriorly to form a subtriangular plate behind; suprahumeral horns arising from top of pronotum, subhorizontal, curving downward and backward to an extent which continues the line of the anterior margin of the pronotum; posterior process long, decurved, gradually acuminate, follow-

[15] Mon. Memb. (1903), 256.

[16] Fauna of British India—Rhynchota (1907), 4, 36.

ing the curve made by the internal margin of the tegmina, sharply carinate above, two short lateral carinæ at base; dorsal carina percurrent from anterior base of pronotal horns to tip of posterior process. Tegmina long, somewhat narrow; black, opaque, deeply and regularly punctate, and sparingly pubescent at base; hyaline in middle; costal area for two thirds the length of the tegmen black and punctate; apical fourth red with smoky brown border; veins distinct, assuming the color of the part of the tegmen traversed. Undersurface of body black; abdomen black with segments bordered with yellow. Legs fuscous-ferruginous; femora somewhat swollen; tibiæ slightly foliaceous and covered with fine spines; tarsi flavous and spined; claws brown. Type, female.

Length, 10.5 mm.; width between extremities of pronotal horns, 8.6 mm.

MINDANAO, Iligan (*Baker*).

The type specimen bears Baker's duplicate No. 3115.

The male is smaller and darker and lacks much of the snowy white pubescence on the front and sides of the pronotum. The brown border on the tips of the tegmina is not so prominent.

Length, 8 mm.; width between tips of horns, 7 mm.

I take pleasure in dedicating this very interesting species to Professor C. F. Baker, through whose kindness I have been permitted to examine most of the species recorded in this study.

Genus SERTORIUS Stål

Centrotus FABR. (in part).

The standing of the genus *Sertorius* may be seriously questioned, but it is here included, pending further knowledge of the group. As diagnosed by Stål, the characters may be stated as follows: Posterior process present; tibiæ simple; underwings with four apical areas; exterior discoidal cell of tegmina never petiolate; posterior process touching scutellum; thorax strongly elevated; horns present above lateral angles; longitudinal ridge of thorax not elevated between lateral horns; lateral horns never compressed anteriorly and posteriorly; tegmina with five complete apical areas; sides of scutellum distinctly prominent; eyes slightly prominent; two interior longitudinal veins of corium joining transverse veins before the middle.[17]

According to this description the genus differs from *Centrotypus* Stål only by the presence of a cross vein at the base of the tegmen, a structure which both Goding [18] and Kirkaldy [19] have remarked as being of very doubtful value as a generic character.

[17] Vide Stål, Hem. Afr. (1866), 4, 87.

Sertorius erigens Walk.

Centrotus erigens Walk., List Hom. Brit. Mus. (1851), 614.
Sertorius erigens Stål, Hem. Phil. (1870), 727.

Black; head and pronotum roughly punctured. Head narrower than anterior pronotum, wider than long. Pronotum convex, slightly ridged, very deep in front, rising vertically from the head; lateral angles obtuse, not prominent. Suprahumeral horns broad, thick, prismatic, diverging, very slightly inclined backward and downward, as long as the space between them; sides conical, slightly and irregularly ridged, of almost equal breadth. Posterior process deep at base, slender and tapering toward apex, triquetrous, slightly curved, extending beyond tip of abdomen. Abdomen tinged with gray. Tegmina blackish brown along the borders, almost colorless in the middle, three fourths of costal border and base punctate. Hindwings almost colorless.

Length, 10 mm.; width between extremities of outstretched tegmina, 18 mm.

This description is adapted from Walker.

Philippine Islands (Walker, Stål).

Genus **PERIAMAN** Distant

Centrotus Fabr. (in part).

A genus with species bearing a superficial resemblance to those of *Centrotus*, but at once distinguished by the four apical areas of the hind wings. Clypeus extending well below the margin of the head; pronotum convex; suprahumeral horns broad and transverse; posterior process equally as high and extending on a line with the dorsal margin of the metopidium, not extending beyond the internal angle of the tegmina. Tegmina broad with five apical areas. Femora and tibiæ simple.

Distant makes *P. flavolineatus* Buckt. the type of this genus.[20]

Periaman brevifrons sp. nov. Plate I, fig. 8, *a* and *b*.

Very dark brown, almost black; densely punctate, sparingly pubescent; pronotum almost vertical above head; dorsal margin continuing horizontally into the posterior process; suprahumeral horns short, thick, and heavy, compressed dorsoventrally, extending outward, very slightly upward and backward; posterior process robust at base, gradually narrowing, sharply carinate

[18] Mon. Aus. Memb. (1903), 27.
[19] *Bull. Haw. Sug. Pl. Assoc.—Hem.* (1907), 3, 90.
[20] Fauna of British India—Rhynchota (1907), 4, 37.

above; tegmina smoky hyaline, tips fuscous, extreme base black and punctate; legs ferruginous.

Head twice as broad as long, somewhat rugose, pubescent with golden hairs; eyes extremely large and prominent; ocelli translucent, much farther from each other than from the eyes and situated about on a line passing through center of eyes; face sharply emarginate before clypeus; clypeus longer than broad, distinctly set off from head, pubescent at extremity. Pronotum not greatly elevated, vertical above head, flat between horns, percurrent dorsal carina, dorsal line practically straight; humeral horns triquetrous, compressed, broad at base, tips sharp, almost flat above, extending almost directly outward, very slightly upward and backward; posterior process reaching just beyond internal angle of tegmina, stout at base, gradually acuminate, very slightly depressed in middle, tip faintly depressed, dorsal carina percurrent, a lateral carina on each side near margin. Scutellum distinct, pilose. Tegmina smoky hyaline, veins brown, a broad fuscous cloud at tip, base narrowly black and punctate; five apical and two discoidal areas. Hindwings iridescent hyaline, border clear and somewhat wrinkled. Undersurface of body black. Legs ferruginous brown; femora moderately swollen; tibiæ spined; tarsi flavous. Type, female.

Length, head to tip of tegmina, 7 mm.; width between extremities of horns, 3.6 mm.

PALAWAN, Puerto Princesa (*Baker*).

Genus TRICENTRUS Stål

Centrotus FABR. (in part); *Taloipa* BUCKT.

Tricentrus is a well-defined and easily distinguished genus. It is the only genus which shows both the suprahumeral horns and the spined posterior trochanters, the latter character appearing to be a very reliable and sufficient structure for diagnosis. These spines, or teeth, on the inner surface of the posterior trochanters are found also in the genera *Sipylus* and *Centrotoscelus,* but neither of these genera has suprahumeral horns. The function of such a structure is conjectural. The hind wings have three apical areas.

Four species have been described from the Philippines, all of which are recognizable from material at hand. These species, together with two herein described, may be separated as follows:

Key to the Philippine species of Tricentrus.

a^1. Suprahumeral horns at least twice as long as the distance between their bases ..... convergens.

a^2 Suprahumeral horns less than twice as long as the distance between their bases.
  b^1. Suprahumeral horns not extending outward as far as extremities of humeral angles ..... attenuatus.
  b^2. Suprahumeral horns projecting laterally beyond humeral angles.
    c^1. Posterior process curving downward, much depressed at tip.. capreolus.
    c^2. Posterior process straight or nearly so.
      d^1. Veins of tegmina thickly pilose..... pilinervosus.
      d^2. Veins of tegmina smooth or very sparsely pilose.
        e^1. Areas of tegmina much wrinkled..... plicatus.
        e^2. Areas of tegmina smooth..... fairmairei.

Tricentrus convergens Walk. Plate I, fig. 9, *a* and *b*.

Centrotus convergens WALK., List Hom. Brit. Mus. (1851), 623.
Tricentrus convergens STÅL, Hem. Phil. (1870), 728; DIST., Fauna Brit. Ind. (1907), 4, 53; FUNKH., Journ. Ent. & Zool. (1914), 6, 68.

Tricentus convergens is the type species of the genus, originally described from the Philippines by Walker and apparently not uncommon. It may be at once recognized by the very high and flattened, almost foliaceous, suprahumeral horns.

Ferruginous, finely punctate, sparingly pubescent, with sometimes a white tomentose area above and behind the eyes. Suprahumeral horns more than twice as long as the distance between their bases, projecting strongly forward and upward, subparallel, farther apart at their apices than at their bases, tips much rounded and flattened, not at all sharp; posterior process almost straight, tricarinate, dorsal carina high and sharp, extremity reaching just beyond internal angle of tegmina. Tegmina subhyaline, base brown and punctate. Undersurface of body dark brown. Legs ferruginous.

Length, from head to extremity of tegmen, 6 mm.; length of pronotal horns, 2 to 3 mm.; width between extremities of horns, 2 to 3 mm.

Philippines (Walker, Funkhouser); LUZON, Los Baños (*Baker*).

Tricentrus fairmairei Stål. Figs. 1 and 2.

Centrotus fairmairei STÅL, Freg. Eug. Resa, Ins. (1859), 284.
Tricentrus fairmairei STÅL, Analect. Hem. (1866), 387; STÅL, Hem. Phil. (1870), 728; DIST., Fauna Brit. Ind. (1907), 4, 58; FUNKH., Journ. Ent. & Zool. (1914), 6, 67.
Terentius fairmairei BUCKT., Mon. Memb. (1903), 271.
Taloipa tinctoria BUCKT., Trans. Linn. Soc. (1905), 9, 334, Pl. 22, fig. 4.

Tricentrus fairmairei is one of the abundant species of the genus as represented in the Islands. It may be recognized superficially by the reddish tinge over the entire body and tegmina.

Reddish brown, rather bright on posterior process and base of tegmina. Head almost twice as wide as long, obscurely and lightly punctate, irregularly pilose; clypeus projecting for half its length below inferior margin of face, margin slightly rimmed. Pronotum finely punctate, densely pubescent, almost perpendicular above head, strongly convex between horns; suprahumeral horns short, stout, triquetrous, extending almost directly outward, very slightly upward and backward, less than half as long as the distance between their bases; dorsal carina percurrent; posterior process slightly depressed at base, swollen before apex, dorsal carina high and sharp, extremity reaching internal angle of tegmina. Tegmina reddish smoky hyaline, base reddish brown or black and punctate. Legs and undersurface of body ferruginous brown.

The species shows a rather wide range of color, some specimens being much redder than others.

Length, 6 mm.; width between extremities of suprahumeral horns, 3.4 to 3.6 mm.

Bangalore (Buckton); Philippine Islands (Stål, Distant, Funkhouser); LUZON, Los Baños (*Baker*).

Tricentrus capreolus Walk. Plate II, fig. 10, *a* and *b*.

Centrotus capreolus WALK., List Hom. Brit. Mus. (1851), 627.
Tricentrus capreolus STÅL, Hem. Phil. (1870), 728.

A black, robust species, characterized by the rather long depressed posterior process. I have seen one specimen from the Islands, bearing duplicate No. 2650, collected at Mount Banahao by Professor Baker.

Black, finely and obsoletely punctured, sparsely covered with tawny pubescence. Pronotum much convex, projecting well above and before the suprahumeral horns as viewed from the side; suprahumeral horns short and rather blunt, not half as long as the distance between their bases; posterior process smooth, gradually curving, depressed at tip, extending well beyond internal angle of tegmina. Tegmina reddish hyaline, base black and punctate, veins brown, apical margin very slightly fuscous; a whitish patch on base of abdomen often showing through basal area. Undersurface of body black. Legs and feet very dark brown.

Length, 6.5 mm.; width between extremities of suprahumeral horns, 4.6 mm.

Philippine Islands (Walker, Stål); LUZON, Mount Banahao (*Baker*).

Tricentrus pilinervosus Funkh. Plate II, fig. 11, *a* and *b*.

Tricentrus pilinervosus FUNKH., Journ. Ent. & Zool. (1914), 6, 68, figs. 2 and 2a.

A black, stout species with rather widespreading, elevated suprahumeral horns. Near *T. decoratus* Dist., but differing particularly in the shape and position of the posterior process. Veins of tegmina very hairy.

Black, densely and coarsely punctate, sparsely pilose. Suprahumeral horns extending upward, outward, and slightly backward, as seen from above rounded before and almost straight behind. Posterior process narrow, acute, carinate, extending beyond internal angle of tegmina. Tegmina fuscous hyaline, base black and punctate, costal and apical margin clouded; veins each bearing two rows of short bristly hairs. Undersurface of body black. Legs dark ferruginous.

Length, including tegmina, 6 to 7 mm.; width between extremities of horns, 3.5 to 4 mm.

LUZON, Los Baños (*Baker*).

Tricentrus plicatus sp. nov. Plate II, fig. 12, *a* and *b*.

Near *T. fairmairei* Stål, but larger and different in color, in the form of the posterior process, the wrinkled condition of the tegmina, and the shape and position of the suprahumeral horns.

Black, punctured, pubescent; pronotum convex, lateral angles prominent, suprahumeral horns very slender, posterior process gradually acuminate, extending beyond internal angle of tegmina; tegmina smoky hyaline, much wrinkled, black and punctate at base.

Head wider than long, black, finely punctate, very densely pilose with yellow hairs; eyes large, reddish brown, extending beyond lateral margin of pronotum at base of head; ocelli opaque brown, almost equidistant from each other and from the eyes and situated slightly above a line passing through center of eyes; clypeus extending for half its length below the line of the face, sharply emarginate at base, lower margin slightly turned out at edge. Pronotum moderately convex, almost perpendicular above head, rounded between horns, black, finely and densely punctate, thickly pilose with long golden hairs; dorsal carina obsolete before horns, percurrent behind them; humeral angles prominent and auriculate; suprahumeral horns arising from extreme dorsolateral margin of pronotum, very thin as seen from the front, distance between their bases almost twice as great as length of horn, horns extending strongly outward, upward, and backward,

short, acute, somewhat flattened dorsoventrally, upper surface of horn bearing distinct central carina; scutellum distinct, longer than broad; posterior process slender, triquetrous, slightly depressed in middle, lateral margin extended before middle, tip acute, reaching well beyond internal angle of tegmina. Tegmina smoky hyaline, without markings, base black and punctate, entire surface much wrinkled, veins distinct and somewhat punctate along margins with occasional scattered hairs. Undersurface of body black, sides of abdomen and of meso- and metathorax densely pubescent. Femora brown-black and swollen; hind trochanters armed with strong teeth on inner surface; tibiæ flattened, flavous above, very light yellow below, margins bristled; small yellow nodule in joint between femur and tibia; tarsi ferruginous; claws brown. Type, female.

The type specimen bears Baker's duplicate No. 3116.

Length to extremity of tegmen, 7 mm.; width between extremities of suprahumeral horns, 4.8 mm.

MINDANAO, Dapitan (*Baker*).

Tricentrus attenuatus sp. nov. Plate II, fig. 13, *a* and *b*.

Near *T. gibbosulus* Walk., but different in color, in shape and position of suprahumeral horns, and in structure of posterior process.

Testaceous, becoming light brown posteriorly, broad white tomentose patch on sides of meso- and metathorax; suprahumeral horns broad and flattened, not extending outward as far as humeral angles below them; posterior process short, sharp, tectiform, barely reaching the internal angles of tegmina; undersurface of body black; bases of femora very dark brown; extremities of femora, entire tibiæ, tarsi, and claws ferruginous-ochraceous. Size small.

Head broader than long, almost black, very densely and evenly pilose with silvery hairs; eyes large, very prominent, ochraceous, mottled with brown; ocelli pearly, somewhat farther from each other than from the eyes and situated slightly above a line passing through center of eyes; lower margin of face wavy; clypeus extending well below lower margin of face. Pronotum moderately convex, dark brown before shading to lighter behind, uniformly pilose, finely punctate; humeral angles prominent; suprahumeral horns short, sharp, flattened dorsoventrally, not extending outward as far as extremities of humeral angles, projecting outward, upward, and strongly curving backward, anterior margin broadly rounded, posterior margin almost straight, not carinate above; posterior process tectiform, sharply

carinate above, impinging on inner margin of tegmina for entire length below, reaching barely to internal angle of tegmina. Tegmina fuscous hyaline, slightly wrinkled, base dark brown and punctate, veins distinct and brown, narrow brown fascia at extreme exterior tip. Sides of meso- and metathorax directly behind eyes covered with snowy white tomentose patch. Undersurface of body black, slightly pubescent. Femora very dark brown, except extremities which are ferruginous; internal margin of hind trochanters strongly armed with teeth, tibiæ simple and ferruginous; tarsi and claws yellow-ferruginous. Type, male.

Length, 4.5 mm.; width between extremities of horns, 1.9 mm.

MINDANAO, Butuan (*Baker*).

Genus CENTROTUS Fabricius

The advisability of giving the genus *Centrotus* a place in this study is extremely doubtful. It is included entirely on the strength of the descriptions of three species from the Philippines which have been assigned to this genus but which have never been recognized since their original publication.

The genus is one of the oldest and best known of the genera of the Membracidæ, being established by Fabricius in his Systema Rhyngotorum in 1803, and has contained at various times a large number of species now removed to other genera. It appears probable that the species here given will be likewise removed if they are discovered, since the characters of *Centrotus* are much less inclusive than formerly.

The genus as now limited may be recognized by the shape of the posterior process which is distinctly separate and somewhat remote from the scutellum, somewhat extended and widened beneath, then rather abruptly becoming slender, the tip often touching the tegmina. No spines are present on the hind trochanters; the hind wings have three apical areas; the suprahumeral horns are always well developed.

The following must be considered as lost species until examination of type material or careful study of long series of specimens makes their recognition possible.

Centrotus magellani Fairm.

Centrotus magellani FAIRM., Rev. Memb. (1846), 512; WALK., List Hom. Brit. Mus. (1851), 604.

A translation of Fairmaire's original description is as follows:

12. *C. Magellani.**—Lefebv. Coll. Manilla. Long. 0,006. (Fuscous, elytra

hyaline, base and apex punctate black, anterior horns reversed, compressed, recurved.)

Body and prothorax brown; horns compressed, directed forward, their extremities recurved; posterior spine shorter than abdomen; sides of breast white; on the front of the prothorax two lines between the horns and the head of an indistinct gray; legs ferruginous, knees clearer; elytra hyaline, with a brown spot at the base and at the extremity.

Centrotus dilatatus Walk.

Centrotus dilatatus WALK., List Hom. Brit. Mus. (1851), 630.

Centrotus dilatatus was described from a single specimen of which the head was missing. The description lacks the details necessary for present generic determination and is as follows:

Brown, clothed with dingy tawny hairs; head wanting; fore-chest very broad, indistinctly ridged, low in front; shoulders flat, conical, very prominent; horns above compressed, angular, extremely short; hind appendage very short, triangular, keeled, impressed on each side near the base, not extending much beyond the base of the abdomen; fore-wings grayish, ferruginous at the base; veins ferruginous, nodose. Length of the body 1½ line; of the wings 3 lines.

a. Philippine Islands. From Mr. Cuming's collection.

It should be noted that the length of the wings as given above was used by Walker to refer to the distance between the tips of the tegmina when spread at right angles to the body. The measurements as changed to millimeters then become: Length, 3.16 mm.; width of outstretched wings, 6.33 mm.

The description suggests a small *Tricentrus,* but since the recognition of genera and species in this group depends largely on the shape of the clypeus, the relative position of the ocelli and the eyes, the apical areas of the hindwings, and the structure of the scutellum the description of a headless specimen in the discussion of which neither the scutellum nor the hindwings are mentioned lends itself poorly to purposes of identification.

Centrotus orcus Buckt.

Centrotus orcus BUCKT., Mon. Memb. (1903), 247, Pl. 60, figs. 7, 7a, 7b.

No data concerning *Centrotus orcus* are available, except Buckton's description which is here quoted verbatim:

General form robust and broad between the shoulders. Suprahumerals short, connate and stout. Pronotum narrowed to a short almost stylate posterior horn. Colour sordid olive-green, with ochreous tips to the tegmina. Frons and metopidium hirsute. Legs olive. Tegmina with five distinct apical and three discoidal areas.

Size, 5 x 3 mm. Habitat—Philippine Isles.

Genus SIPYLUS Stål

Centrotus FABR. (in part).

Sipylus is a genus peculiar in having the body very broadly triangular, the width between the humeral angles being usually as great as the extreme length of the pronotum. The other characters assigned by Stål to the genus may be deduced from his key [21] to be as follows: Posterior process present; tibiæ simple; sides of breast unarmed; hindwings with three apical areas; posterior process not distant from scutellum; body obtriangular; suprahumeral horns absent; lateral angles prominent; posterior process short and depressed; posterior trochanters armed with spines on internal margin.

The genus is very distinct in general appearance and not difficult to recognize. Only two species, both from the Philippines, have been assigned to the genus. These may be separated as follows:

Key to the species of Sipylus.

a^1. Veins of tegmina without prominent nodules..... crassulus.
a^2. Veins of tegmina with prominent nodules..... nodipennis.

Sipylus crassulus Stål. Plate II, fig. 14.

Centrotus crassulus STÅL, Freg. Eug. Resa, Ins. (1859), 285.
Sipylus crassulus STÅL, Analect. Hem. (1866), 387. STÅL, Hem. Phil. (1870), 728. BUCKT., Mon. Memb. (1903), 270.

If I am determining *S. crassulus* correctly, it is somewhat variable in size and coloration, and the sexes differ in the length of the auricular humeral angles and in the appearance of the tegmina.

The female is ferruginous brown, punctate, and covered with fine, white, silky pubescence; the humeral angles are very long, almost half as long as the distance between their bases; the pronotum is very convex; the posterior process short, robust, and suddenly acute; the tegmina is smoky, ferruginous, and semiopaque, and more or less wrinkled and with brown punctate base; the legs and undersurface of body are ferruginous.

Length, 5 to 6 mm.; width, 4.5 to 5 mm.

In the male the color is much darker, almost black anteriorly; humeral angles shorter; tegmina almost clear hyaline with black base and white tomentose patch at base of abdomen showing through; undersurface of body black; legs dark brown.

Length, 4 to 5 mm.; width, 3.5 to 4 mm.

Philippines (Stål); LUZON, Mount Banahao (*Baker*).

[21] Hem. Afr. (1866), 4, 88.

Sipylus nodipennis Funkh. Plate II, fig. 15.

Sipylus nodipennis FUNKH., Journ. Ent. & Zool. (1914), 6, 72, fig. 5.

Sipylus nodipennis is easily recognized by the nodules on the veins of the tegmina and the thick yellow pubescence over the whole surface of the body.

The body is subtriangular; the pronotum slightly wider between the humeral angles than the distance from the anterior convexity to the extremity of the posterior process. The tegmina are broad, rounded at apex, subhyaline and punctate at base, and characterized by the presence of the tubercles on the veins. The posterior trochanters are strongly armed with teeth.

Length, female, 3.5 to 4 mm.; male, 3 mm.; width at humeral angles, female, 3.5 mm.; male, 2.75 mm.

LUZON, Los Baños (*Baker*).

Genus CENTROTOSCELUS Funkhouser

The genus *Centrotoscelus* was erected [22] for the reception of its one species. This genus is peculiar in having no suprahumeral horns and yet having strong teeth on the posterior trochanters. It is entirely distinct from *Sipylus*, though falling near it in an artificial key. The genus seems naturally closely related to *Tricentrus*, from which it may be distinguished by the absence of the suprahumeral horns.

The body is long and comparatively slender; scutellum distinct; posterior process short, impinging on scutellum and tegmina; hind wings with three apical areas.

Centrotoscelus typus Funkh. Plate II, fig. 16, *a* and *b*.

Centrotoscelus typus FUNKH., Journ. Ent. & Zool. (1914), 6, 73, figs. 3 and 4.

Ferruginous brown; pronotum finely and densely punctate and sparsely pilose. Posterior process long, narrow, gradually acuminate, slightly depressed at tip, extending somewhat beyond internal angles of tegmina; median ridge distinct at apex, but becoming obsolete at metopidium. Tegmina subhyaline, brown and punctate at base, a very narrow brown transverse stripe behind middle and a faint brown cloud at apex. Legs ferruginous; tarsi yellowish; claws black. Segments of abdomen margined with white above.

Length, female, 5 mm.; male, 4.33 mm.; width, female, 2.5 mm.; male, 2.2 mm.

LUZON, Los Baños (*Baker*).

[22] *Journ. Ent. & Zool.* (1914), 6, 72.

Genus **EBHUL** Distant

Centrotus FABR. (in part); *Leptobelus* STÅL (in part).

The genus *Ebhul* was erected by Distant,[23] with *E. varius* Walk. as the type, to include those species of the division *Gargararia* in which the posterior pronotal process is strongly, sinuately waved.

Other generic characters given by the author are the convexly gibbous, strongly ridged pronotum, the scutellum which is almost as broad as long, the face longitudinally sulcate with the beak reaching the posterior coxæ, and the broad, ample tegmina crossed by a series of transverse veins at its apical area.

To this genus must be assigned the following new species:

Ebhul carinatus sp. nov. Plate II, fig. 17, *a* and *b*.

Ferruginous and black, distinctly marked, punctate, pubescent; anterior pronotum high, entire pronotum sharply carinate; posterior process uniform in size from base to apex, strongly sinuate, extending beyond internal angle of tegmina; tegmina strikingly marked with black, brown, white, and hyaline; undersurface of body almost black; legs ferruginous.

Head including clypeus much longer than wide, center of base much higher than upper margin of eyes, very finely and obsoletely punctate, densely pubescent with white hairs; eyes large, prominent, brown mottled with black; ocelli pearly, semitransparent, much farther from each other than from the eyes and situated about on an imaginary line passing through center of eyes; clypeus set off by distinct suture from head, extending far below the lower margin of the face, subtriangular at base, rather narrow for the rest of its length and truncate at apex. Pronotum rising high above head, finely punctate and pubescent with white hairs, dorsal carina high, sharp, and percurrent; on each side above humeral angles a short, sharp, elevated carina suggesting the beginning of suprahumeral horns; lateral angles prominent; no suprahumeral horns; scutellum distinct, exposed by the elevation of the posterior process above it; posterior process uniform in size, brown at base, white in middle and black at extremity, a deep depression just behind crest of pronotum, another just behind apex of scutellum, the lower line following these curves to form decided sinuosities, tip subacute, triquetrous, extending beyond internal angle of tegmina. Tegmina brown, pubescent and punctate at base, this area followed by a tringular

[23] Fauna of British India—Rhynchota (1907), 4, 59.

black fascia with base next to posterior process, next to this a triangular white area narrowest above, beyond this a second broad, black fascia extending almost to tip, which is subhyaline. Undersurface of body almost black anteriorly with white pubescence; abdomen fuscous ferruginous. Legs simple, ferruginous; tarsi somewhat darker. Type, male.

Length, 5 mm.; maximum width, 2 mm.

MINDANAO, Butuan (*Baker*).

Genus GARGARA Amyot and Serville

Membracis FABR. (in part); *Centrotus* FABR. (in part); *Oxyrhachis* GERM. (in part); *Smilia* GERM. (in part); *Maerops* BUCKT.

Gargara is the most richly represented, thus far, of all the genera of the Membracidæ found in the Philippines. Twelve species are here recognized and future collecting will doubtless yield many more. The genus has a wide range, the type species (*G. genistæ* Fabr.) being found in Europe, while many forms have been recorded from Asia, Africa, and the East Indies.

The species are for the most part small and without the striking pronotal developments so common to the family. From the small size and commonplace appearance of its species the genus was named by its authors [24] from the fancied resemblance to a seed.

The pronotal horns are lacking, the posterior trochanters unarmed, the pronotum usually smooth, and the posterior process straight.

The following key, while based on characters entirely artificial, will, it is believed, enable the student to locate all of the species known to the Islands to date. However, any dichotomous table is more or less unsatisfactory, and the full descriptions must be consulted for final recognition of the species.

Key to the Philippine species of Gargara.

a^1. Pronotum entirely black or very dark.

b^1. Median dorsal ridge distinct and prominent on anterior pronotum as seen from front.

c^1. Tips of tegmina hyaline or nearly so..... luconica.

c^2. Tips of tegmina opaque or concolorous with rest of tegmina. varicolor.

b^2. Median dorsal ridge not present on anterior pronotum or if present very obsolete and faint.

c^1. Posterior process extending beyond tip of abdomen; large trifoliate spot on tegmen..... trifoliata.

[24] Histoire Naturelle des Insectes—Hemiptères (1843), 527.

c^2. Posterior process not reaching tip of abdomen.
d^1. Tegmina entirely hyaline, except small black punctate area at base ..... nigrocarinata.
d^2. Tegmina more or less colored and opaque.
e^1. Front of head densely, posterior process slightly, pubescent. nigrofasciata.
e^2. Front of head not densely, posterior process not at all, pubescent.
f^1. Size very small, apical fourth of tegmina entirely hyaline. pygmaea.
f^2. Size larger, apical fourth of tegmina not hyaline.... patruelis.
a^2. Pronotum yellow, or very light brown at least in the females.
b^1. Veins of tegmina bearing nodules..... tuberculata.
b^2. Veins of tegmina not bearing nodules.
c^1. Tegmina entirely opaque.
d^1. Tegmina uniform yellow..... luteipennis.
d^2. Tegmina strongly marked with dark brown and white. pulchripennis.
c^2. Tegmina hyaline at least for apical four fifths.
d^1. Head much deflexed; pronotum concolorous or nearly so; tegmina clear ..... brunnea.
d^2. Head almost perpendicular; pronotum marked with brown and yellow; tegmina iridescent..... nitidipennis.

Gargara luconica Fairm.

Membracis luconica FAIRM., Rev. Memb. (1846), 255.
Enchenopa luconica WALK., List Hom. Brit. Mus. (1851), 484.
Gargara luconica STÅL, Hem. Phil. (1870), 728.

A small, black, rather robust species with carinate posterior process and dull, opaque tegmina with hyaline tips.

Head broader than long, black, finely punctate, sparsely pilose with silvery hairs; eyes almost white with brown fascia; ocelli pearly, farther from each other than from the eyes and situated slightly above a line passing through center of eyes; clypeus strongly deflexed and extending far below margin of face. Pronotum uniform black, finely punctate, and sparingly pubescent with silvery hairs; median carina percurrent from head to apex of posterior process; humeral angles not prominent; posterior process sharply carinate, tectiform, extending just beyond internal angle of tegmina. Tegmina opaque, except at tips, which are yellowish hyaline; basal and costal areas black and punctate; veins prominent and bearing scattered silvery hairs. Undersurface of body black; legs very dark ferruginous brown, almost black; tarsi very light brown; claws ferruginous.

Length, 3 mm.; maximum width, 1.7 mm.

Philippine Islands (Fairmaire); NEGROS, Cuernos Mountains; MINDANAO, Dapitan; LUZON, Mount Maquiling (*Baker*).

Gargara pygmaea Walk.

Centrotus pygmaeus WALK., List Hom. Brit. Mus. (1851), 630.
Gargara pygmaea BANKS, Phil. Journ. Sci., Sec. D (1910), 5, 48.

I have seen the material which C. S. Banks determined as *G. pygmaea* and believe this determination to be correct. The specimens do not agree with the original description as well as might be desired in some minor respects, but on the whole they answer Walker's description. The specimens which I have seen, however, are all decidedly black, with only a tinge of brown or ferruginous around the anterior and ventral regions, while the original description would have them brown.

This species is very near *G. luconica* Fairm., as I determine that species, but is smaller, and the tegmina are shining black and not dull opaque. In both species the tips of the tegmina are more or less hyaline.

The specimens bear Professor Baker's duplicate Nos. 3951 and 2656.

Very small, black, and shining; posterior process straight and sharp; tegmina glistening black for basal four fifths with tips hyaline.

Head about as long as wide, finely and densely punctate, not pubescent; eyes red-brown; ocelli very small, much farther from each other than from the eyes and situated above a line passing through center of eyes; front of head not greatly deflexed, almost perpendicular, front convex; clypeus extending below margin of face. Pronotum strongly sloping backward from head, black, finely punctate, very sparsely pilose; median dorsal carina distinct behind humeral angles, but obsolete and only obscurely visible before them; humeral angles not prominent; posterior process subtriquetrous hardly reaching internal angle of tegmina. Tegmina glistening, very dark brown or black for basal four fifths, apex hyaline; base black and punctate; veins prominent. Legs and undersurface of body black; tarsi flavous.

Length, 2.5 mm.; maximum width, 1.2 mm.

Philippine Islands (Walker, Banks); PALAWAN, Puerto Princesa; LUZON, Mount Banahao (*Baker*).

Gargara patruelis Stål.

Centrotus patruelis STÅL, Freg. Eug. Resa, Ins. (1859), 285.
Gargara patruelis STÅL, Hem. Phil. (1870), 728.

Rather large, black, robust, without percurrent dorsal carina. Tegmina translucent smoky ferruginous with base and large part of costal area black and punctured. Posterior process strong, sharp, somewhat decurved.

Head wider than long, black, sparingly pubescent with golden hairs; eyes mottled brown; ocelli pearly, not prominent, farther from each other than from the eyes and situated above a line passing through center of eyes; clypeus short, wider than long, continuing irregularly the sinuate outline of the face. Pronotum black, punctate, sparsely pilose, sloping gradually backward above the head; lateral angles obtuse, not prominent; posterior process strong, gradually acuminate, decurved and turning downward at tip, tip extending beyond internal angles of tegmina. Tegmina smoky hyaline, except the black and punctate base which extends down into the costal area; veins prominent, slightly elevated, and brown. Undersurface of body black. Femora and tibiæ black; tarsi flavous.

Length, 4 mm.; maximum width, 2 mm.

Philippine Islands (Stål); LUZON, Malinao, Tayabas, Mount Banahao (*Baker*).

Gargara varicolor Stål. Plate II, fig. 18.

Gargara varicolor STÅL, Hem. Phil. (1870), 728; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

Gargara varicolor is closely related to *G. patruelis*, but is smaller and differs particularly in the presence of a strong anterior ridge extending over the metopidium and in the markings of the tegmina. The species, as I determine it, varies considerably in size and color, but the tegminal markings appear to be constant. Stål recognizes three varieties, "a," "b," and "c"—the first with pronotum black; the second black with median and lateral stripe; the third ferruginous with black spots on posterior process. Of these I have seen only the first, but in the specimens at hand the color ranges from black to light ferruginous.

Stål describes the tegmina as "vitreis, pone medium fascia fuscescente notatis, pone fasciam subvinaceis, basi punctulatis," and I find an apparently trustworthy character in the fact that the fuscous marking extends into the black punctate base in a wedge-shaped tooth.

The pronotum is sparingly pubescent with yellowish hairs and is very densely and finely punctate. The posterior process is somewhat depressed in the middle and at the tip.

Gargara varicolor seems to be one of the commonest of the Philippine membracids, and many specimens have been studied.

Length, 4.5 mm.; maximum width, 2 mm.

Philippine Islands (Stål); LUZON, Los Baños, Mount Maquiling, Mount Banahao (*Baker*).

Gargara pulchripennis Stål.

Gargara pulchripennis STÅL, Hem. Phil. (1870), 729; FUNKH., Journ. Ent. & Zool. (1914), 6, 70.

Gargara pulchripennis may be recognized at once by the beautiful dark brown and white markings of the tegmina. These markings are rather irregular and confluent, but usually show a distinct cross stripe of white near the base, followed by checkered areas of small brown and white patches. The base of the tegmina is ferruginous and pubescent, the tip narrowly dark brown with a white stripe just before it. The entire tegmen is opaque.

The posterior process is rather short, not reaching the interior angle of the tegmina, slightly depressed at base, and bluntly tectiform at tip. The scutellum is very distinct.

Length, 4 mm.; maximum width, 2 mm.

Philippine Islands (Stål); MINDANAO, Butuan; LUZON, Mount Maquiling, Los Baños (*Baker*).

Gargara nigrofasciata Stål.

Gargara nigrofasciata STÅL, Hem. Phil. (1870), 729; FUNKH., Journ. Ent. & Zool. (1914), 6, 70; FUNKH., Journ. N. Y. Ent. Soc. (1914), 22, 235.

Gargara nigrofasciata is apparently variable, showing a gradation in tegminal markings from the broad-striped form described by Stål to specimens in which the stripe is narrowed to a very narrow ferruginous line. There seem to be no specific differences in the series.

Usually the median dorsal carina is obsolete or visible only upon the posterior process. This process is rather thin and very sharp, reaching the internal angle of the tegmina. The pronotum is black, densely punctate, but not pubescent. The eyes are very prominent and reddish.

The description of a single individual would be misleading, owing to the variety of tegminal markings, and since these markings were used as the principal character in erecting the species, a long series must be studied before accurate specific limits can be established.

Length, 3.5 mm.; maximum width, 1.5 mm.

Philippine Islands (Stål); LUZON, Mount Maquiling, Mount Banahao; MINDANAO, Iligan, Dapitan (*Baker*).

Gargara tuberculata Funkh.

Gargara tuberculata FUNKH., Journ. Ent. & Zool. (1914), 6, 70, fig. 6.

Gargara tuberculata may be recognized by the prominent tubercles upon the veins of the tegmina and upon the pronotum.

Entirely lemon yellow with white lines extending over the shoulders. Head yellow. Posterior process set off from thorax by deep notch on each side. Tegmina yellow, opaque; base punctate and pubescent; veins nodulose. Undersurface of body white tomentose. Legs yellow.

Length, 4 to 4.5 mm.; maximum width, 2 to 2.5 mm.

LUZON, Los Baños (*Baker*).

Gargara luteipennis Funkh.

Gargara luteipennis FUNKH., Journ. Ent. & Zool. (1914), 6, 71, fig. 7.

Gargara luteipennis is of about the size of *G. tuberculata* and resembles it in color, but lacks the granules on tegmina and pronotum. The tegmina are very characteristic, being a flat yellow, not shining or glistening, and with broad, well-marked veins.

Entirely light yellow. Pronotum finely punctate, but not pubescent. Posterior process acuminate, extending as far as the internal angles of the tegmina.

Length, 4 mm.; maximum width, 2.5 mm.

LUZON, Los Baños (*Baker*).

The single type specimen of this species bears Professor Baker's duplicate No. 954.

Gargara nitidipennis Funkh.

Gargara nitidipennis FUNKH., Journ. Ent. & Zool. (1914), 6, 71.

The type specimens of *G. nitidipennis* were rather small, the type measuring 3.5 mm. and the allotype 3.33 mm. Material has since been received which includes specimens 5 mm. in length, so that the insect appears to be somewhat variable as to size.

The specific characters, however, are very constant, especially the extremely iridescent tegmina and the brown- and yellow-marked pronotum. The body is yellow with broad brown fasciæ on anterior metopidium and apex of posterior process. The latter is strong and heavy, slightly depressed at tip, and reaching to the internal angles of the tegmina. The undersurface of the body is ferruginous brown, the legs often being lighter.

Length, 3.5 to 5 mm.; maximum width, 1.3 to 2.2 mm.

LUZON, Los Baños, Mount Maquiling, Mount Banahao; MINDANAO, Iligan, Dapitan; Butuan (*Baker*).

Gargara nigrocarinata Funkh.

Gargara nigrocarinata Funkh., Journ. N. Y. Ent. Soc. (1914), 22, 234, fig. 1.

Gargara nigrocarinata is a small black species, recognizable by the high ridge on the posterior process and the delicate hyaline tegmina with their sharply marked black bases.

The pronotum is finely punctate and bears short, yellowish or silvery hairs; obtusely rounded in front with prominent lateral angles; median carina obsolete before humeral angles, but well developed posteriorly and becoming high and sharp on posterior process. Head longer than wide; eyes prominent, usually reddish in the females and pearly in the males.

Length, 3 to 3.5 mm.; maximum width, 1.5 to 1.8 mm.

Luzon, Los Baños, Mount Maquiling (*Baker*).

Gargara brunnea Funkh.

Gargara brunnea Funkh., Journ. N. Y. Ent. Soc. (1914), 22, 235, fig. 2.

Robust, brown, punctate, pubescent. Head broader than long, inflexed. Pronotum low and broad anteriorly; humeral angles obtuse; posterior process long, sloping downward, extending slightly beyond internal angles of tegmina, apex carinate. Tegmina opaque hyaline, except at base, which is brown and punctate.

Length, 3.5 to 4 mm.; maximum width, 2 to 2.3 mm.

Luzon, Mount Maquiling (*Baker*).

Gargara trifoliata Funkh. Plate II, fig. 19.

Gargara trifoliata Funkh., Journ. N. Y. Ent. Soc. (1914), 22, 235, fig. 3.

The largest and most distinct of all the species of this genus hitherto described from the Islands is *Gargara trifoliata.* It should be easily recognized by the large trifoliate white marking on each tegmen and by the very long, decurved posterior process.

Black, punctate, head and anterior pronotum pubescent. Posterior process heavy and strongly tricarinate, extending to a point more than halfway between the internal angle and the tip of the tegmen. Tegmina black for basal two thirds, on this black area the characteristic clover-leaf hyaline spot, apical third orange-yellow, tip bearing brown band.

Length, 8 mm.; maximum width, 4 mm.

Luzon, Mount Maquiling (*Baker*).

Genus CRYPTASPIDIA Stål

The genus *Cryptaspidia,* although clearly set off from the foregoing by natural characters, is rather hard to delimit by the use of artificial ones. It can best be recognized by its general appearance and differs greatly from *Gargara* in the size of its species and the difference in the structure shown in the pronotal process.

All of the species assigned to the genus are from the Philippines and were described by Stål in his Hemiptera insularum Philippinarum in 1870.

The insects are long-bodied, rather slender, with very thin, convex metopidia and gradually acuminate posterior processes. The tegmina show two discoidal cells, and this character is given by Stål as generic, but is not in itself sufficient. The hind wings have three apical areas, and the posterior trochanters are without spines.

Four species are known and may be separated as follows:

Key to the species of Cryptaspidia.

a^1. Median dorsal carina entirely lacking..... pubera.
a^2. Median dorsal carina visible although sometimes faint.
  b^1. Size small, not over 5 mm. in length..... tagalica.
  b^2. Size large, not less than 6 mm. in length.
    c^1. Head strongly convex..... impressa.
    c^2. Head not strongly convex..... obtusiceps.

Cryptaspidia pubera Stål. Plate II, fig. 20.

Cryptaspidia pubera STÅL, Hem. Phil. (1870), 729; BUCKT., Mon. Memb. (1903), 267; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

Black, finely and densely punctate, more or less pubescent with flavous hairs. No dorsal carina. Humeral angles obtuse and not prominent. Tegmina ferruginous, somewhat pubescent.

Head entirely covered with matted golden hairs; ocelli pearly, farther from each other than from the eyes, situated above a line passing through center of eyes. Pronotum very convex anteriorly, sparsely pubescent, gradually sloping into posterior process which is rather short, thick, and not carinate. Tegmina rough, somewhat wrinkled, fuscous ferruginous and sparingly pubescent; base black and punctate, this area extending down upon the costal margin. Undersurface of body strongly pubescent. Legs and feet uniformly flavous.

Stål described the tegmina as fuscous hyaline, but in all of the specimens studied they have inclined to opaqueness, especially when seen against the hind wing and abdomen.

Length, 5.5 mm.; maximum width, 2.7 mm.

Philippine Islands (Stål); LUZON, Los Baños, Mount Maquiling (*Baker*).

Cryptaspidia tagalica Stål.

Cryptaspidia tagalica STÅL, Hem. Phil. (1870), 729; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

Cryptaspidia tagalica is the smallest species of the genus thus far described. The specimens studied agree well in size and color and vary only slightly in tegminal markings.

Black, coarsely and densely punctate, the punctures being much larger and farther apart on the posterior process than on the metopidium. Head somewhat broader than long, punctate, pilose with long yellowish hairs; ocelli distinct, transparent, much farther from each other than from the eyes and situated well above a line passing through center of eyes; clypeus broader than long, only slightly deflexed, pilose; anterior margin of head rounded between the eyes. Pronotum almost perpendicular above the head, very obtusely convex, sparingly pilose over lateral angles; lateral angles rounded, not prominent; posterior process not set off from anterior pronotum by a hollowing out above scutellum, but continuing to a gradual point from the humeral angles, apex acute, very slightly depressed. Tegmina wine-colored, base black and punctate, a rather narrow fuscous band across middle, another near tip, apex hyaline. Undersurface of body and femora black; tibiæ and tarsi ferruginous.

Length, 4.5 mm.; maximum width, 2 mm.

Philippine Islands (Stål); LUZON, Los Baños, Mount Maquiling (*Baker*).

I have seen specimens close to this species, but apparently distinct, which I would not care to describe as new from the limited material. It may be that the species varies more greatly than the above diagnosis would imply.

Cryptaspidia impressa Stål.

Cryptaspidia impressa STÅL, Hem. Phil. (1870), 730; BUCKT., Mon. Memb. (1903), 267.

Cryptaspidia impressa is very close to *C. pubera*, but is larger and shows a distinct carina on the posterior process.

Black, punctate, and pubescent with grayish hairs. Head broader than long, very convex between the eyes, pubescent; ocelli opalescent, farther from each other than from the eyes; eyes prominent; clypeus strongly pilose. Pronotum rounded anteriorly with faint median carina on metopidium which be-

comes strong and sharp on posterior process. Tegmina fuscous hyaline, marked with more or less irregular fascia of ferruginous.

Length, 6 to 7 mm.; maximum width, 3 to 3.5 mm.

Philippine Islands (Stål).

Cryptaspidia obtusiceps Stål.

Cryptaspidia obtusiceps STÅL, Hem. Phil. (1870), 730.

Cryptaspidia obtusiceps is known to me only from the original description, which follows. It is apparently very close to *C. impressa* and is to be distinguished chiefly by the less convex head as suggested in the key. Stål describes it after *C. impressa* as follows:

Praecedenti simillima et maxime affinis, differt capite anterius inter oculos sensim obtuse rotundato, fronte obtusissima, deorsum haud prominula. ♀ Long. 6-7, lat. 3-3½ mill.

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ILLUSTRATIONS

Plate I

Fig. 1. *Centrochares horrificus* Westw.
2. *Pyrgonota bifoliata* Westw.
3. *Pyrgonota pinguiturris* sp. nov.
4. *Leptobelus dama* Germ.
5. *Dograna falco* Buckt.
6. *Leptocentrus reponens* Walk., *a*, frontal outline; *b*, lateral outline.
7. *Emphusis bakeri* sp. nov., *a*, frontal outline; *b*, lateral outline.
8. *Periaman brevifrons* sp. nov., *a*, frontal outline; *b*, lateral outline.
9. *Tricentrus convergens* Walk., *a*, frontal outline; *b*, lateral outline.

Plate II

Fig. 10. *Tricentrus capreolus* Walk., *a*, frontal outline; *b*, lateral outline.
11. *Tricentrus pilinervosus* Funkh., *a*, frontal outline; *b*, lateral outline.
12. *Tricentrus plicatus* sp. nov., *a*, frontal outline; *b*, lateral outline.
13. *Tricentrus attenuatus* sp. nov., *a*, frontal outline; *b*, lateral outline.
14. *Sipylus crassulus* Stål.
15. *Sipylus nodipennis* Funkh.
16. *Centrotoscelus typus* Funkh., *a*, frontal outline; *b*, lateral outline.
17. *Ebhul carinatus* sp. nov., *a*, frontal outline; *b*, lateral outline.
18. *Gargara varicolor* Stål.
19. *Gargara trifoliata* Funkh.
20. Tegmen of *Cryptaspidia pubera* Stål.

Text figures

Fig. 1. Fore and hind wings of *Tricentrus fairmairei* Stål. *a*, discoidal cells; *b*, apical cells; *c*, internal angle.
2. Front and lateral outline of *Tricentrus fairmairei* Stål. *a*, humeral angles; *b*, suprahumeral horns; *c*, metopidium; *d*, clypeus, *e*, posterior process.
3. Armed posterior trochanters.

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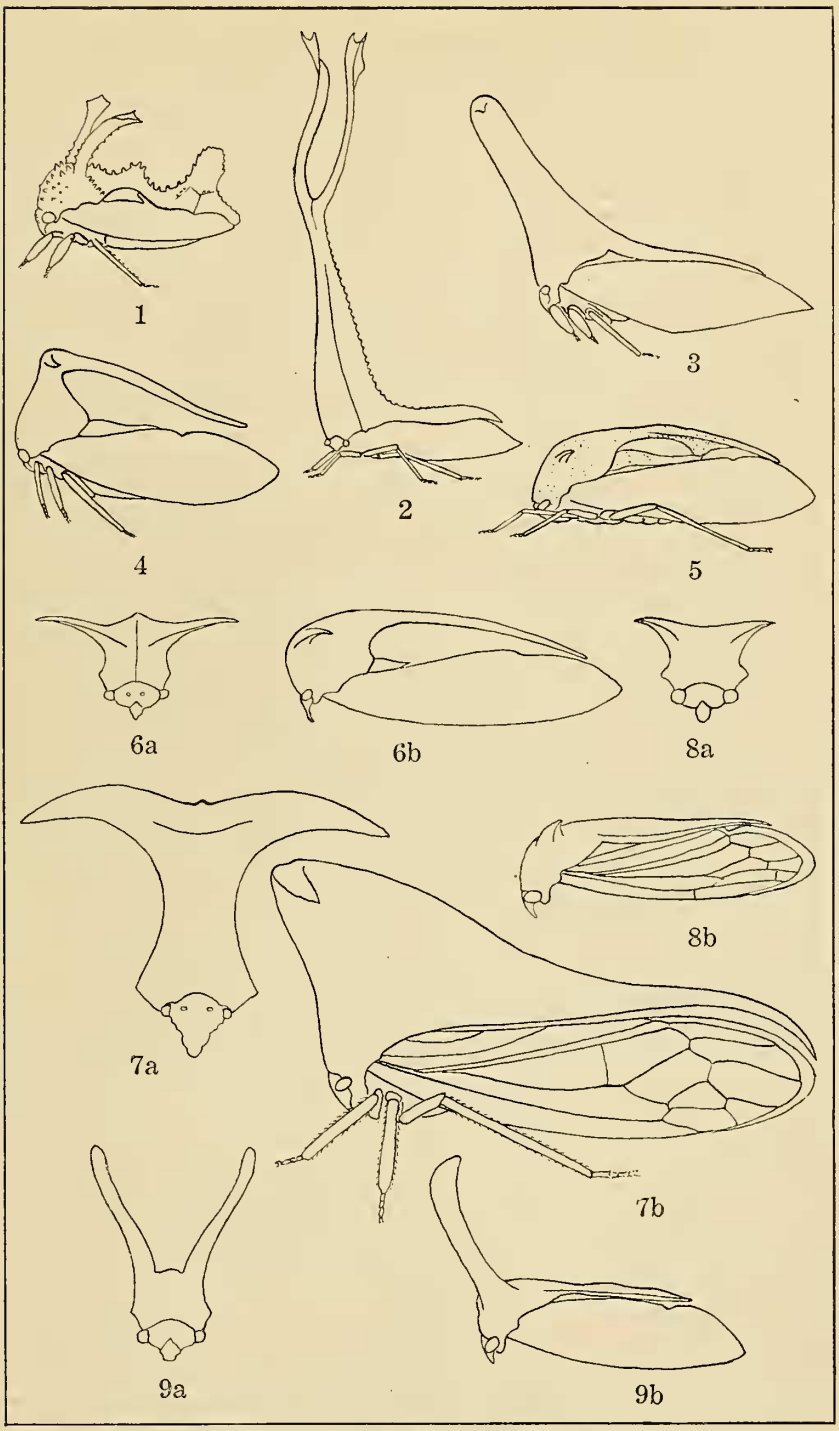

PLATE I. PHILIPPINE MEMBRACIDÆ.

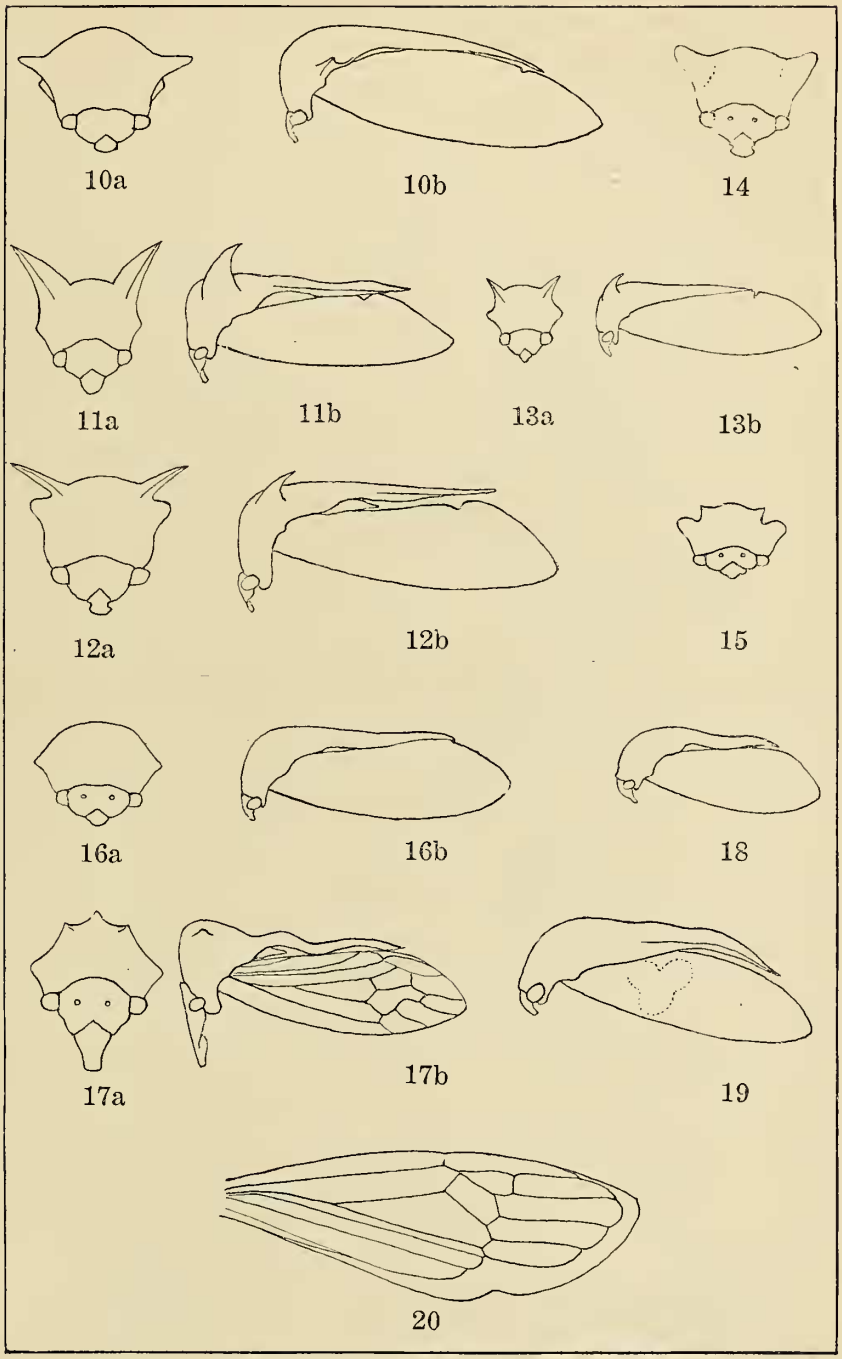

PLATE II. PHILIPPINE MEMBRACIDÆ.